Apple II: Using a Switchbox With ImageWriter II

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Security: Everyone

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TOPIC ----------

I am having problems with my Apple II, switch boxes, and ImageWriter II.

What actually is the difference between the ImageWriter and the ImageWriter II? Is there solution guaranteed to work?

Do you know of anybody who is having success with ImageWriter IIs and switch boxes?

DISCUSSION ----------

The workaround is to use XON/XOFF handshaking.

Following is an explanation of what happens when switching between an Apple IIGS and an Apple IIe. Also included is an explanation of why this may not be a problem with ImageWriters, and why a MicroBuffer may cure this as well.

Set-Up:

Our configuration to test this problem was an Apple IIe equipped with a Super Serial Card, an Apple IIGS, and an ImageWriter II, along with two commercial switch boxes. Line status was monitored with a Data Specification RS-232 Break-Out box. A Fluke 8050A Digital Multi-Meter was used to measure the voltage levels. Software used was AppleWriter II with the same file open on both systems.

The Test:
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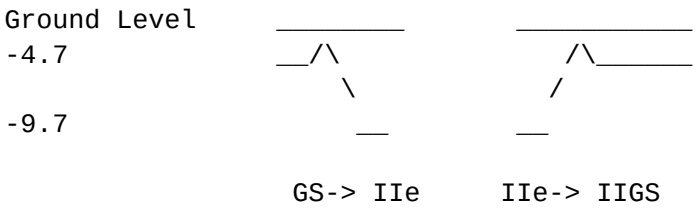
When switching between the systems, transitions were noted on the Transmit line, which caused DTR from the printer to go into the high state, effectively

shutting off communication with the connected computer. If the printer does a reset in between the systems, the now-connected system prints correctly. If there is no reset when switching, it is necessary to reset the printer by either deselecting/selecting, as you stated, or by powering off the printer, and powering it on again. Either of these actions resets the DTR line and re-establishes communications with the computer.

Our first thought was to use a switch box with a make-before-break switch. The reason this would not work with Apple IIe and Apple IIGS systems connected is the difference in voltage levels between the systems. The Apple IIGS system output device, AMD 26LS30, is supplied with +/-5VDC, while the Super Serial Card output device, TI 75189, is provided with +/-12VDC. This means that the Apple IIGS outputs -4.7 volts for a "Low" signal while the Apple IIe outputs -9.7 volts. When the switch is thrown from one position to the other, here's what happens:



With the switch type a break-before-make, when the switch opens between contacts, the voltage level rises to Ground, then drops to a Low level again. This positive transition to Ground causes the printer to see either a start bit or a DSR level shift from the computer, which then sets DTR false. If the switch box is a make-before-break switch, there would be current flow from the Apple IIe into the Apple IIGS output because of the different voltage level in the output "Low" signal, which could cause damage to the interface chips in the Apple IIGS.

XON/XOFF works because the printer sends/receives the XON/XOFF handshaking over the normal data communications lines, pins 2 and 3, and even though these lines are affected by the level transitions caused by the switch action, these transitions are not recognized as XON/XOFF by the printer or the computer. Because the equipment doesn't see these transitions as requests to halt data flow, there is no attendant response to incorrect data by the printer, and the information flow continues.

The ImageWriter has 75189 receiver chips installed, functionally equivalent to the 1489 Line Receiver, which are much less sensitive to level transitions because they are designed to operate at lower frequency limits. This causes them to be much more tolerant of the level transitions that occur during the actual time of the switch. ImageWriter IIs have 26LS32s for receivers. They are designed for higher speed use, and thus are much more sensitive to the level transitions occurring. This is our interpretation of why this problem does not exist with the ImageWriter.

A MicroBuffer might cure this problem because the ImageWriter II responds to the level transitions occurring during the switch time, but when this transition is sent to a buffer, it knows it is not data, so it ignores the change in potential between connections.

To use XON/XOFF with older software, it is necessary to use a pre-boot program to set up the Super Serial Card before using the software. On the Apple IIGS, if you cannot gain access to the Control Panel from within the application, the pre-boot needs to be used there, too.

The pre-boot program should look like this in DOS 3.3 or ProDOS:

```
10 D$=CHR$(4)
20 PRINT D$;"PR#1"
30 PRINT CHR$(9);"X E";CHR$(13)
40 PRINT D$;"PR#0"
```

Enter this short program into the system in immediate mode prior to starting up the systems, or save it on disk as either a HELLO (DOS 3.3) or STARTUP (ProDOS) program to run before the software boots.

Bottom Line

Change the ImageWriter II to XON/XOFF handshaking by setting SW 2-3 Open, and the problem of not being able to print from multiple systems should vanish. It is less convenient, but we have not been able to make the setup fail using this method.

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